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UREA SYNTHESIS BY THE SHEEP FOETUS

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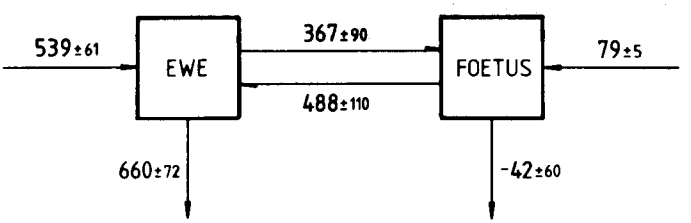
A large fraction of the net amino acid uptake by the sheep foetus is catabolized (Battaglia and Meschia 1978). Urea synthesis reflects amino acid catabolism and can be used to estimate the contribution of amino acid oxidation to foetal oxygen consumption. A contribution of 0.25 was calculated by Gresham *et al.* (1972) from an estimate of placental urea clearance; foetal urea synthesis has not been measured directly.

Four Corriedale ewes, each carrying a single foetus, were given 803 g DM/d of a pelleted mixture of lucerne hay and oats (3:2) throughout pregnancy. At joining they were 18 months old and weighed 43.4 ± SE 2.1 kg; at slaughter on day 135, ewe liveweight less gravid uterus was 43.5 ± 0.6 kg and foetal weight was 3.25 ± 0.08 kg. Feed was given continuously from a moving belt from day 117. On day 124, catheters were implanted in a carotid artery and jugular vein of the ewe and the dorsal aorta and a femoral vein of the foetus; ^{14}C-urea was infused at a constant rate into the maternal or foetal vein on day 132 and into the foetal or maternal vein on day 134. Specific activity of urea was determined in samples taken from the arterial catheters during each infusion. Urea N flows through the maternal and foetal pools were calculated from the plateau specific activities (Nolan *et al.* 1976) assuming no significant metabolic change between days 132 and 134.

Fig. 1. Urea N flows (mg/hr) in sheep 133 days pregnant



Mean (± SE) maternal and foetal arterial plasma urea N levels were, respectively, 113 ± 15 and 139 ± 12 mg/ℓ. Urea N flow rates (mg/hr) are shown in Fig. 1; 46 ± 5% of the maternal urea N pool came from the foetus and 81 ± 3% of the foetal urea N pool came from the ewe. Foetal urea synthesis amounted to 24.5 ± 1.8 mg N/(hr kg). Oxidation of an amino acid mixture ('average' composition:16% N, 53%C) which would release this amount of N would require 151.5 ml oxygen/(hr kg). Thus, if foetal oxygen uptake is 360 ml/(hr kg) (James *et al.* 1972), 0.42 of it could be accounted for by amino acid oxidation. This is higher than estimated by Gresham *et al.* (1972) and suggests that the importance of amino acids as fuel for the unstressed sheep foetus may have been underestimated.

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